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मानक

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IS 7092-2 (1987): Aluminium Alloy Tube for Irrigation Purposes, Part 2: Extruded Tube [MTD 7: Light Metals and their Alloys]



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“Knowledge is such a treasure which cannot be stolen”



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**AMENDMENT NO. 2 OCTOBER 1995  
TO  
IS 7092 ( Part 2 ) : 1987 SPECIFICATION FOR  
ALUMINIUM ALLOY TUBE FOR IRRIGATION  
PURPOSES**

**PART 2 EXTRUDED TUBE**

*( Second Revision )*

*( Amendment No. 1, December 1992, page 2, Table 2, col 3 ) — Substitute  
'1/2 ( AA+BB ) - ( d )' for '1/2 ( AA+BB ) - ( d )'.*

**( MTD 7 )**

**AMENDMENT NO. 1 DECEMBER 1992**  
**TO**  
**IS 7092 ( Part 2 ) : 1987 SPECIFICATION FOR**  
**ALUMINIUM ALLOY TUBE FOR IRRIGATION**  
**PURPOSES**

**PART 2 EXTRUDED TUBE**

*( Second Revision )*

( Aluminium alloy tubes are widely used in sprinkler irrigation systems, which have now become popular even with small farmers. Therefore, need has been felt to standardize the requirements of some additional intermediate sizes on lower side to provide wider choice to small farmers. Accordingly it has been decided to include 63 mm and 90 mm nominal size tubes through this amendment. )

( *Cover page, pages 1 and 3, title* ) — Substitute the word 'Tubes' for 'Tube' wherever appears.

( *Page 6, Table 1* ) — Substitute the following for the existing Table:

**Table 1 Requirements for Drift Expanding Test**

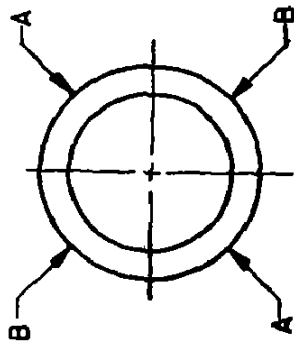
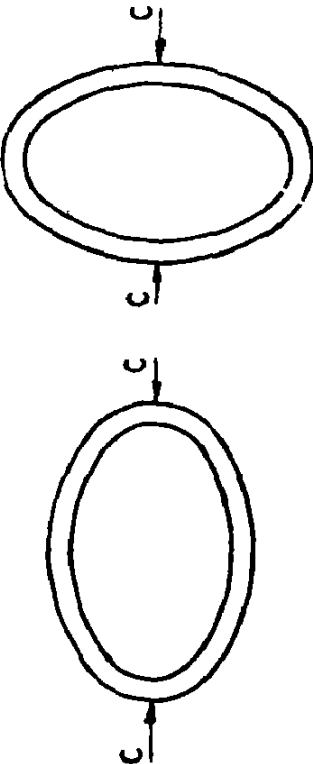
*( Clause 6.3 )*

Nominal Size	Outside Diameter	Wall Thickness	Length of Test Piece	Angle of Mandrel	Expanded Inside Diameter
mm	<i>d</i> mm	<i>Min</i> mm	( <i>L</i> ) mm	( $\beta$ ) Degree	mm
(1)	(2)	(3)	(4)	(5)	(6)
50	50.8	1.27	100	30	55
63	63.5	1.27	125	30	66
75	76.2	1.27	150	30	81
90	88.9	1.27	175	30	94
100	101.6	1.27	200	30	109
125	127.0	1.32	250	30	136
150	152.4	1.47	300	30	163
175	177.8	1.63	350	30	190
200	203.2	1.83	400	30	217

( *Page 7, Table 2* ) — Substitute the table given on page 2 for the existing Table:

**Table 2 Dimensions and Tolerances for Extruded Tubes**  
( Clause 7.1 )

All dimensions in millimetres.

Nominal Size	Outside Diameter	Tolerance on Outside Diameter	Roundness or Ovality Tolerance on Outside Diameter	Wall Thickness Min
(1)	(d)	$1/2 (AA \pm BB) \rightarrow (d)$	CC $\rightarrow (d)$	(5)
50	50.8	$\pm 0.40$	$\pm 1.27$	1.27
63	63.5	$\pm 0.40$	$\pm 1.27$	1.27
75	76.2	$\pm 0.40$	$\pm 1.27$	1.27
90	88.9	$\pm 0.50$	$\pm 1.27$	1.27
100	101.6	$\pm 0.65$	$\pm 1.27$	1.27
125	127.0	$\pm 0.65$	$\pm 1.65$	1.32
150	152.4	$\pm 0.90$	$\pm 2.03$	1.47
175	177.8	$\pm 0.90$	$\pm 2.20$	1.63
200	203.2	$\pm 1.15$	$\pm 2.55$	1.83

NOTE — Tolerances are applicable at the finished end of the tube.

( Page 8 clause 9.1, line 2 ) — Substitute the word 'or' for 'on'.  
( MTD 7 )

**IS : 7092 ( Part 2 ) - 1987**

( Reaffirmed 2001 )

*Indian Standard*

**SPECIFICATION FOR  
ALUMINIUM ALLOY TUBE FOR  
IRRIGATION PURPOSES**

**PART 2 EXTRUDED TUBE**

*( Second Revision )*

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**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

**Gr 2**

*August 1987*

IS : 7092 ( Part 2 ) - 1987

*Indian Standard*  
**SPECIFICATION FOR  
ALUMINIUM ALLOY TUBE FOR  
IRRIGATION PURPOSES**  
**PART 2 EXTRUDED TUBE**  
*( Second Revision )*

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( Continued on page 2 )

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**IS : 7092 ( Part 2 ) - 1987**

( Continued from page 1 )

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*Indian Standard*  
SPECIFICATION FOR  
ALUMINIUM ALLOY TUBE FOR  
IRRIGATION PURPOSES  
PART 2 EXTRUDED TUBE  
( *Second Revision* )

0. F O R E W O R D

**0.1** This Indian Standard ( Part 2 ) ( Second Revision ) was adopted by the Bureau of Indian Standards on 20 May 1987, after the draft finalized by the Light Metals and Their Alloys Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** This standard was first published in 1973, and subsequently revised in 1976, when it was issued in two separate parts covering the requirements of welded and extruded tubes in Part 1 and Part 2, respectively. The present revision of Part 2 has been done in the light of experience gained in the manufacture and usage of such tubes.

**0.3** In this revision following modifications have been done:

- a) Maximum diameters up to 200 mm have been incorporated;
- b) Flattening test has been replaced by drift expanding test;
- c) Denting factor has been deleted;
- d) Sampling plan for hydrostatic pressure test has been added; and
- e) Table 2 on tolerances has been modified.

**0.4** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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\*Rules for rounding off numerical values ( *revised* ).

**IS : 7092 ( Part 2 ) - 1987**

**1. SCOPE**

**1.1** This standard ( Part 2 ) covers the requirement of extruded aluminium alloy tubes used for irrigation purposes and suitable for a maximum working pressure of 1 000 kN/m<sup>2</sup> ( 10 kgf/cm<sup>2</sup> ) for diameters up to and including 200 mm.

**2. TERMINOLOGY**

**2.0** For the purpose of this standard, the following definition as given in IS : 5047 ( Part 1 )-1986\* shall apply.

**2.1 Extruded Tube** — A hollow extrusion of uniform wall thickness, not subjected to cold drawing.

**3. SUPPLY OF MATERIAL**

**3.1** General requirements relating to the supply of material shall conform to IS : 10259-1982†.

**3.2** The tube supplied shall be of aluminium alloy 63400 in WP temper with mechanical properties as given in 6.2.

**4. WORKMANSHIP AND FINISH**

**4.1** The tube shall be of uniform quality and temper, clean and sound, and free from harmful defects.

**4.2** Solution heat treated tubes may get discoloured and such discolouration shall not be the cause of rejection.

**4.3** Die-stop and handling marks appearing on the surface of tube, which are within dimensional tolerance of the tube, shall not constitute a cause for rejection.

**5. SELECTION OF TEST SAMPLES**

**5.1 Batch** — The tubes of the same composition, temper and dimensions produced and tempered in the same way at the same place shall be grouped in batches of 1 000 kgs.

**5.2 Chemical Analysis, Tensile Test, Drift Expanding Test** — One test piece each shall be taken from a tube selected at random to represent each batch for chemical analysis, tensile test and drift expanding test. Before test samples are cut off, they shall be marked to identify them with the batch they represent.

\*Glossary of terms relating to aluminium and aluminium alloy: Part 1 Unwrought and wrought metals ( *second revision* ).

†General condition of delivery and inspection of aluminium and aluminium alloy products.

**5.2.1** The test piece shall be taken from the tube as supplied and shall not be subjected to any thermal or mechanical working ( except in the preparation of test piece before testing ).

**5.2.2** The tensile test piece shall be taken from the tube in the direction of the extrusion.

**5.3 Hydrostatic Pressure Test** — From each batch of the tubes, 5 percent of the tubes shall be tested for hydrostatic pressure test.

**5.3.1** The tubes for this test shall be so selected that the samples are scattered covering entire period of production of that batch.

**5.3.2** The full length of the tube shall be tested at internal hydrostatic pressure of 2 000 kN/m<sup>2</sup> ( 20 kgf/cm<sup>2</sup> ) for one minute without any leakage.

## 6. REQUIREMENTS FOR THE MATERIAL

**6.1 Chemical Composition** — The chemical composition of the material used for extruded tube shall comply with the composition requirements for alloy 63400 as given below:

<i>Elements</i>	<i>Percent, Max</i> ( Unless show otherwise )
Copper	0.1
Magnesium	0.4-0.9
Silicon	0.3-0.7
Iron	0.6
Manganese	0.3
Zinc	0.2
Chromium	0.1
Titanium and/or other grain refining elements	0.2
Aluminium	Remainder

**6.1.1** The chemical composition of the sample drawn according to 5.2, shall be determined either by the method specified in IS : 504-1963\* or any other established instrumental/chemical method. In case of dispute, IS : 504-1963\* shall be the referee method.

**6.2 Mechanical Properties** — The test piece ( see 5 ) when tested in accordance with IS : 2657-1964† for tensile test shall satisfy the following requirements:

Ultimate tensile strength, <i>Min</i>	185 MPa
0.2 Percent proof strength, <i>Min</i>	150 MPa
Elongation on 50 mm gauge length, <i>Min</i>	7 percent

\*Methods of chemical analysis of aluminium and its alloys ( revised ).

†Method for tensile testing of aluminium and alloy tube.

**IS : 7092 ( Part 2 ) - 1987**

**6.3 Drift Expanding Test** — Drift expanding test shall be carried out in accordance with IS : 2335-1985\*. A piece of tube having length 'L' shall be tested in respect of each batch, by means of a conical drift ( mandrel ) having an included angle of 30° until the internal diameter of the tube at the mouth expands as indicated in col 6 of Table 1.

**TABLE 1 REQUIREMENTS FOR DRIFT EXPANDING TEST**

NOMINAL SIZE	OUTSIDE DIAMETER (4)	WALL THICKNESS Min (3)	LENGTH OF TEST PIECE (L) (4)	ANGLE OF MANDREL (8) (5)	EXPANDED INSIDE DIAMETER (6)
(1)	(2)	(3)	(4)	(5)	(6)
mm	mm	mm	mm	Degree	mm
50	50.8	1.27	100	30	55
75	76.2	1.27	150	30	81
100	101.6	1.27	200	30	109
125	127.0	1.32	250	30	136
150	152.4	1.47	300	30	163
175	177.8	1.63	350	30	190
200	203.2	1.83	400	30	217

**6.4 Hydrostatic Pressure Test Requirements** — The manufacturer shall guarantee that all extruded tubes are capable of withstanding the internal hydrostatic pressure of 2 000 kN/m<sup>2</sup> ( 20 kgf/cm<sup>2</sup> ) for one minute without any leakage.

NOTE — If specified by the purchaser for specific applications, such as use of irrigation tubing in hilly terrain, the tube may be tested at 3 000 kN/m<sup>2</sup> ( 30 kgf/cm<sup>2</sup> ).

**7. DIMENSIONS AND TOLERANCES**

**7.1** The dimensions and tolerances of extruded tubes used for irrigation purposes shall be as given in Table 2.

**7.2** Unless otherwise agreed to, the length of each tube shall be 6 metres with a tolerance of  $\pm 1$  cm.

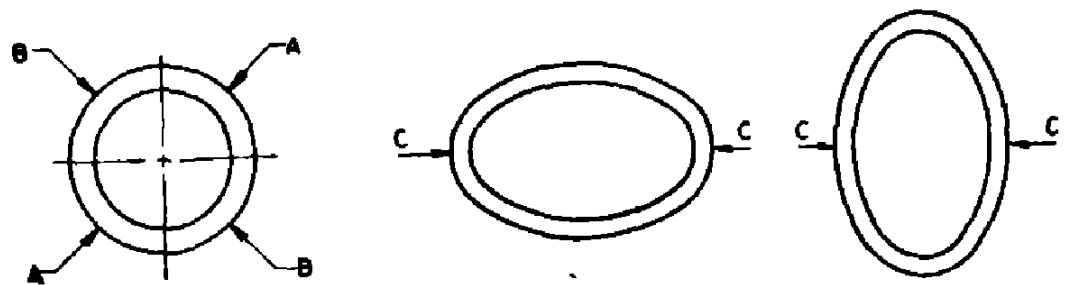
**8. RETEST**

**8.1 Tensile Test and Drift Expanding Test** — If any one of the test pieces first selected fail to pass the tensile test and drift expanding test, two further samples from the same batch shall be selected for testing, one of which shall be from the tube from which the original test sample was taken unless that tube has been withdrawn by the supplier.

\*Method of drift expanding test on metallic tubes ( first revision ).

**TABLE 2 DIMENSIONS AND TOLERANCES FOR EXTRUDED TUBES**  
( *Class 7.1* )

All dimensions in millimetres.



NOMINAL SIZE	OUTSIDE DIAMETER (d)	TOLERANCE ON OUTSIDE DIAMETER $\frac{1}{2} (AA + BB) - (d)$	ROUNDNESS OR OVALITY TOL- ERANCE ON OUT- SIDE DIAMETER $CC - (d)$	WALL THICKNESS Min
(1)	(2)	(3)	(4)	(5)
50	50.8	$\pm 0.40$	$\pm 1.27$	1.27
75	76.2	$\pm 0.40$	$\pm 1.27$	1.27
100	101.6	$\pm 0.65$	$\pm 1.27$	1.27
125	127.0	$\pm 0.65$	$\pm 1.65$	1.32
150	152.4	$\pm 0.90$	$\pm 2.03$	1.47
175	177.8	$\pm 0.90$	$\pm 2.20$	1.63
200	203.2	$\pm 1.15$	$\pm 2.55$	1.83

NOTE — Tolerances are applicable at the finished end of the tube.

**8.1.1** If the test piece from either of these additional samples fail, the batch represented by the test sample shall be deemed not to comply with this specification.

**8.2 Hydrostatic Pressure Test** — If any of the tubes in the sample first selected fails in hydrostatic pressure test, 10 percent of the tubes from the remaining tubes in the batch shall be selected according to 5.3.1 and tested for hydrostatic pressure test.

**8.2.1** If any of these additional tubes fail, the entire batch shall be rejected. However, the manufacturer if so desires can process the batch according to 8.2.2.

**8.2.2** Each tube of the batch shall be tested for hydrostatic pressure test. The tubes passing the test and the tubes failing in the test shall be separated. The tubes failing shall be rejected. The tubes passing shall be treated as passing this requirement of the specification.

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**9. MARKING**

**9.1** Each tube shall be suitably marked for identification with the logo/ name of manufacturer on his trade-mark, month and year of manufacture. If required, the supplier shall furnish a certificate that the material supplied complies with the requirements of this specification.

**9.1.1** The material may also be marked with the Standard Mark.

**NOTE —** The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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